Level Densities in ^{56,57}Fe

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Knowledge of the level density is important in many branches of nuclear physics, nuclear astrophysics and applied areas. Recently the Oslo group has extracted level densities for ^{56}Fe and ^{57}Fe nuclei from primary γ spectra using (^{3}He, $\alpha\gamma$) and (^{3}He, ^{3}He'γ) reactions on ^{57}Fe target[1]. ^{56}Fe nucleus has significant astrophysical importance. The modern view predicts the direct production of ^{56}Fe isotope in terms of weak nuclear statistical equilibrium (NSE)[2].

In the present contribution we have calculated the level densities of ^{56}Fe and ^{57}Fe nuclei on the basis of realistic shell model and the BCS Hamiltonian with inclusion of pairing interaction [3]. The experimental nuclear level densities have been compared with the results obtained with the microscopic theory . These results together with the calculational procedure will be presented and discussed.

References:

[1] A Schiller et. al., Phys. Rev. C68, 054326 (2003).
[2] G. wallenstein et. al., Rev. Mod. Phys. 69, 995 (1997).
[3] A.N. Behkami et. al., Phys. Rev. C66, 064307 (2002).

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